REMARKS

Claims 12-21 are pending; claims 12, 15 and 18 have been amended and claims 20 and 21 are withdrawn from consideration by the examiner.

Support for the amendments to claim 12 can be found, *inter alia*, on page 5, lines 19-22 and lines 35-45; on page 9, lines 25, 28 and in original claims 4 and 7.

The amendments to the specification are believed to overcome the examiner's objections thereto.

The examiner has required restriction under 35 U.S.C. 121 and 372 between

Group I, claims 12-19, drawn to a multitube reaction and

Group II, claims 20-21, drawn to methods of reaction, stating that the inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: claim 1 is either obvious over or anticipated by Ruppel et al. (see U.S. P. 5,821,390; particularly Figure; column 2, lines 3-19; column 6, lines 3-12). Accordingly, the special technical feature linking the two inventions (i.e. a multitube reactor with 10,000 to 50,000 catalyst tubes within an outer wall, a means for introducing and discharging a heat transfer medium, and a tube spacing to tube diameter ratio) does not provide a contribution over the prior art. Therefore, there is no unity of invention and lack of unity is held by the examiner.

Contrary to the examiner's conclusion there is unity of invention between the reaction and its use because the special technical features are not anticipated or made obvious by Ruppel et al. as will be shown in the discussion of the rejection of the claims

by Ruppel et al. Therefore, the examiner is requested to withdraw the restriction requirement. It is assumed that claims 20 and 21 will be rejoined and allowed if claims 12-19 are allowed. Applicants' confirm the election of claims 12-19.

Claims 12 and 19 stand rejected as being anticipated by Ruppel et al. (U.S. 5,821,390).

The examiner hold that a ratio $5/d_a$ in a range of 1.1 - 2.1 is known from Ruppel. However, it is noted that this alleged teaching is not explicitly disclosed but calculated by the examiner using arbitrary values of tube spacing, internal diameter and wall thickness of the catalyst tubes. Ruppel is silent as to whether all theoretically possible ratios should in fact be used. Instead, the only ratios actually disclosed, namely those of the examples of Ruppel correspond to 1.28 or less and are therefore will below the lower limit mentioned in new claim 12. It is therefore submitted that Ruppel does teach to arrange the tubes in a manner that the ratio t/d_a is within the specific range of new claim 12. Thus, there is no anticipation since there is no single embodiment within Ruppel disclosing any overlapping range or a value within the claimed range of 1.3 to 1.6. The rejection is actually based on the examiner's belief that values within the range are <u>obvious</u> in view of the calculations. Accordingly, this rejection should be withdrawn.

In fact, while Ruppel merely recites typical wall thickness and internal diameter ranges of the tubes on the one hand and typical tube spacing on the other hand, a person skilled setting up an industrial scale reactor would select dimensions such that a maximum throughput can be obtained. such an approach will lead to t/d_a ratios well

below 1.3 as clearly demonstrated by example 1 of Ruppel.

Claims 13-16 stand rejected as being obvious over Ruppel in view of Westerman et al. (U.S. 4,894,205) while claims 12, 17 and 19 stand rejected as being obvious over Groten et al. (U.S. 5,730,843) in view of Ruppel et al.

This rejection assumes that (1) Ruppel discloses t/d_a ratios of 1.1 to 2./02 . As indicated above, the claimed ratios are not disclosed under 35 USC 102(b).

The claimed ratio is also not obvious from Ruppel.

Contrary to what a person skilled in the art would normally try to achieve, namely to arrange the tubes as closely as possible (c.f. example 1 of Ruppel), the present invention teaches to arrange the tubes no closer than down to a t/d_a ratio of 1.3. In fact, Ruppel does not teach that a particular ratio of t/d_a is of any importance.

As compared with ratios below 1.3 as known from Ruppel, selecting a lower limit of 1.3 according to the present invention allows higher heat transfer medium flow without having to increase pump power. Higher heat transfer medium flow allows to increase the load of gaseous reactants and to fully benefit from employing modern highly efficient catalyst materials. Thus, the increased heat generated by an increased load of reactants can easily be withdrawn from the reactor of the present invention without leading to an increased energy consumption for operating the pumps.

Further, a higher heat transfer medium flow leads to a more uniform temperature distribution across the reactor cross section and to a reduction in the hot spots. This allows for an increase of the inflow temperature of the heat transfer medium without exceeding the maximum permissible exit temperature which leads to an improved

selectivity of the reaction and consequently to an increase of yield of up to 2% (c.f. page 4, lines 30-35 of the present specification.)

The upper limit of the t/d_a ratio in claim 12 is selected to avoid an undue increase of the external diameter of the reactor (for a given number of tubes).

Within the claimed range from 1.3 and 1.6, manufacturing costs of a reactor will decrease due to the fact that arranging the catalyst tubes less tightly packed is technically less demanding. This cost effective manufacturing process will even allow to compensate for slightly increased material costs, if any, which are due to an increased diameter of the reactor (for a given numbers of tubes).

Neither Ruppel nor Westerman (U.S. 4,894,205) nor Groten (U.S. 5,730,843) nor the general knowledge of a person skilled in the art suggest that selecting a t/d_a ratio as defined in claim 12 will lead to an increased product yield while maintaining both the manufacturing costs and the operational costs practically unchanged or even as compared to the reactors of prior art. Thus, the claimed process leads to unexpected results over the art of record.

Additionally, it was further surprisingly found, that the beneficial effects obtained by selecting a certain t/d_a ratio as outlined above are most notable when the heat transfer medium is essentially conveyed radially or transversely around the catalyst tubes. Thus, this additional limitation has been added in amended claim 12.

Finally, regarding Westerman which has been cited against claims 13-16, it is noted that Westerman is not at all concerned with the effects of increased bundle diameter on the ratio t/d_a. In the example of col. 1, lines 52-56 cited by the examiner,

the bundle diameter (essentially corresponding to the diameter of the reactor) remains constant (5 m) and does not teach anything on its effect on t/d_a ratio.

In fact, it is not readily apparent to one skilled in the art why the t/d_a ratio should vary at all with increasing bundle diameter.

The subject matter of claim 13, increasing tube spacing, facilitates the heat transfer in larger multitube reactor and results in a more uniform temperature over the cross-section. Claim 13 is thus, clearly patentable over Westerman in view of Ruppel.

The unobviousness of the claimed ratio t/d_a can be shown in a Rule 132 declaration if the examiner deems that such a declaration would be helpful.

Favorable action by the examiner is solicited.

A check for $950.00 is attached for a three month extension of time. Should this be deficient, kindly charge Deposit Account No. 11-0345.

Respectfully submitted,

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